

“On the Causation of the so-called ‘Peripheral Reflex Secretion’ of the Pancreas. (Preliminary Communication.)” By W. M. BAYLISS, D.Sc., and ERNEST H. STARLING, M.D., F.R.S. Received January 22,—Read January 23, 1902.

(From the Physiological Laboratory, University College, London.)

Introduction.

It has long been known that the introduction of acid into the duodenum causes a flow of pancreatic juice, and it has been shown recently by Popielski, and by Wertheimer and Le Page, that this flow still occurs after nervous isolation of duodenum and pancreas.

Wertheimer also mentions that the flow can be excited by injection of acid into the jejunum, but not by introduction of acid into the lower part of the ileum.

These authors conclude that the secretion is a local reflex, the centres being situated in the scattered ganglia of the pancreas, or, in the case of the jejunum, in the ganglia of the solar plexus (Wertheimer).

Results.

The secretion excited by introduction of acid into the jejunum cannot be reflex, since it occurs after extirpation of the solar plexus and destruction of all the nervous filaments passing to the isolated loop of jejunum. It also occurs after intravenous injection of 0.01 gramme atropin sulphate. It must therefore be due to direct excitation of the gland cells by a substance or substances conveyed to the gland from the bowel by the blood stream.

The exciting substance is not acid. Wertheimer has shown that injection of 0.4 per cent. HCl into the blood stream has no excitatory influence on the pancreas.

The secretion must therefore be due to some substance produced in the intestinal mucous membrane under the influence of the acid, and carried thence by the blood stream to the gland.

This conclusion was at once confirmed by experiment.

When the mucous membrane of the jejunum or duodenum is exposed to the action of 0.4 per cent. HCl a body is produced which, when injected in minimal doses into the blood stream, produces a copious secretion of pancreatic juice. This body, which for the present we may term *secretin*, is associated with another body with a pronounced lowering effect on the blood pressure. The two bodies are not identical, since acid extracts of the lower end of the ileum produce the pressure-lowering effect, but have no excitatory influence on the pancreas.

The action of the acid is to split off the *secretin* from a precursor,

prosecretin, which is present in relatively large amounts in the duodenal mucous membrane, gradually diminishing as we descend the intestine.

The *prosecretin* is apparently slightly soluble in 0.9 per cent. NaCl solution. It has no influence on the pancreatic secretion.

The *secretin* may also be split off from its precursor by boiling this with 0.9 per cent. saline.

The acid extract may be boiled, neutralised, and filtered without losing its activity. The active filtrate contains some primary albumoses which may be precipitated by addition of large excess of alcohol and ether, and have no action on the pancreas. The alcoholic ethereal filtrate contains only a small amount of organic material, but on evaporating to dryness and taking up the residue with water, the solution obtained is as active as the original infusion.

These results indicate that *secretin* is probably a body of very definite composition, and of small molecular weight. Dr. Osborne is at present engaged in an investigation of its chemical characters and identity.

A chemical sympathy between different organs has often been assumed, as, *e.g.*, between uterus and mammary glands, but we believe that this is the first case in which direct experimental proof has been afforded of such a relationship. It is probable, however, that this acid-duodenum-pancreas mechanism will prove to be but one of a whole class of similar mechanisms, the study of which should considerably increase our control of the various chemical functions of the body.

In the light of the results here noted, a revision of Pawlow's experiments is necessary. In none of these latter was a possible expulsion of acid from stomach into duodenum excluded. We have so far failed to obtain a secretory effect on the pancreas by stimulation of the vagi, and are therefore rather sceptical of the alleged presence in these nerves of secretomotor fibres to the pancreas. We are continuing our experiments on this and kindred points.

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